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execution, etc., can alone make any one familiar with." ('Technical Ed'n in Russia,' p. 12.)

As to values, let us teach intrinsic values, not market values; the latter are fluctuating with time and place, the former are permanent.

No scheme of American education is complete without a careful study of the duties and responsibilities of citizenship. The tramp, like the political leech, assumes that the world owes him a living; the good citizen knows that he owes it to the state to earn his own living, to support his family and to contribute his share to the necessary expenses of the city, state and nation. Hence the youth must learn how the city, state and nation are respectively organized and what their proper functions are; and when he is a man he must to the extent of his ability see to it that those functions are placed in the hands of public servants who are both capable and honest. The corrupting influence of a politician who fosters selfishness in his neighborhood, that he and his neighbors may profit at the expense of other neighborhoods, must be counteracted by a generous education which shall cultivate a love of justice and plant the seeds of manly and noble ideals. If democratic governments are to survive, the whole people must be educated to the highest standards of citizenship, and the new education must face and solve the problem of securing those results.

CALVIN M. WOODWARD.

WASHINGTON UNIVERSITY, ST. LOUIS.

SECTION C (CHEMISTRY) OF THE AMERICAN ASSOCIATION.

IN accordance with the recent custom, the meetings of Section C were held conjointly with those of the American Chemical Society, the officers of the latter presiding on Monday and Tuesday and those of the former during the remainder of the ses-

sion. The meetings proved to be of unusual interest, a large number of valuable papers being presented. Eighty persons, representing twenty-three different States, were in attendance.

The Section was first called to order Monday, August 26, at 11:30 a. m., by Vice-president, Jno. H. Long. Mr. Franklin Guiterman was introduced and welcomed the members on behalf of the chemists and metallurgists of Colorado. Brief responses were made by F. W. Clarke, President of the American Chemical Society and Vice-president Long. Section C was then organized in accordance with the provisions of the constitution. The following were the officers for the Denver meeting:

Vice-president, Jno. H. Long.

Secretary, Wm. McPherson.

Sectional Committee: J. L. Howe, Vice-president, Section C, 1900; A. A. Noyes, Secretary, Section C, 1900; Jno. H. Long, Vice-president, Section C, 1901; Wm. McPherson, Secretary, Section C, 1901; W. D. Bancroft, C. S. Palmer, A. Lachman.

Member of General Committee, H. W. Hillyer.

Member of Council, C. S. Palmer.

Press Secretary, C. L. Parsons.

After the organization of Section C, the officers of the American Chemical Society took charge of the meeting. With the exception of Wednesday afternoon, two sessions were held daily until the final adjournment on Friday. Wednesday afternoon was given up to a visit to the Denver Smelting Works, under the direction of Mr. Franklin Guiterman. A special train conveyed the visitors to the Argo, Grant and Globe Works, successively. In the evening a subscription dinner was given at the University Club by the courtesy of the House Committee. After the final adjournment on Friday a number of the chemists accepted the invitation of Mr. J. D. Hawkins to visit the works of the various smelting companies at Colorado City.

At the meeting of the General Commit-

tee on Thursday evening, Professor H. A. Weber, Ohio State University, and Professor Francis C. Phillips, University of Western Pennsylvania, were elected respectively Vice-president and Secretary of Section C for the Pittsburg meeting, 1902.

The following is a complete list of papers presented at the meeting, together with brief abstracts whenever it was possible to secure these from the authors.

1. 'Report of the Census Committee of the American Chemical Society': CHAS. BASKERVILLE, *Chairman*.

The report included a detailed résumé of improved conditions in the teaching of chemistry in the United States; of the establishment of agricultural colleges, technical institutions, standard bureaus; comparative statements of the training of chemists and chemical engineers in the United States and indications of directions for even greater improvement and extension of the work of the larger institutions; suggestions for the guidance of growth of the smaller colleges.

The complete report will be published in the memorial volume of the twenty-fifth anniversary of the American Chemical Society.

2. 'A Summary of the Analyses of some Massive and Eruptive Rocks of Boulder County, Colorado': CHAS. SKEELE PALMER.

The paper included a condensed statement of the analyses of typical or characteristic rocks of Boulder county. The work was done largely by seniors in the chemical laboratory of the University of Colorado, with the view of training the individual student in the accuracy and independence necessary for original work; also with the further view of adding to the general knowledge of the composition of the rocks of this region. The paper will be published in the *Journal of the American Chemical Society*.

3. 'Recent Developments in Physical Chemistry': WILDER D. BANCROFT.

A résumé was given of the important work done recently in physical chemistry in the various laboratories both in the United States and foreign countries.

4. 'On the Optical Rotation of Certain Tartrates in Glycerol': J. H. LONG.

The rotation of the ordinary tartrates in water is well known, and it has been shown that in dilute solutions the molecular rotations are nearly constant. In this paper the rotations of the following bodies in glycerol are discussed: Potassium sodium tartrate, ammonium tartrate, ammonium hydrogen tartrate, potassium antimonyl tartrate, ammonium antimonyl tartrate and potassium boryl tartrate.

In the cases of the antimony compounds, the molecular rotations agree very well with each other, and also with the rotations in water solution for the same salts; their molecular rotations are therefore very different from those of the simple salts of tartaric acid, which suggests, possibly, that the active acid ion here is no longer that of tartaric acid. Following the suggestion of Clarke, it may be that we have here to deal with salts of tartrantimonious acid ($C_4H_4O_6Sb$)OH, the properties of which are very different from those of the dibasic tartaric acid.

The behavior of the borotartrate in glycerol is very different from that in water, and also different from that of the antimony compound. It is likely that the assumed analogy between these bodies does not hold. There is nothing especially noteworthy in the behavior of the simpler tartrates in glycerol. For Rochelle salt the rotation is larger than that in water and in marked degree variable with the concentration.

5. 'The Atomic Volume Curve in Relation to the Periodic Sequence': CHAS. SKEELE PALMER.

The author proposes a new form of Lothar Meyer's curve which seems to indicate the form in short and long independ-

ent series as the more natural one for the periodic sequence.

The paper will be submitted to the American Chemical Society for publication.

6. 'Report on some of the Mineral Waters of the Philippine Islands': G. B. FRANKFORTER.

The author called attention to the occurrence of lithium in many of the samples. Rubidium and caesium were also found in some cases.

7. 'Proper Methods of Teaching Physical Chemistry': WILDER D. BANCROFT.

According to the author, an introductory lecture course in physical chemistry should begin with the physics of one-component systems, the formation, separation, properties and identification of phases. Next should come the corresponding study of two-component systems, stress being laid on the variation of properties with concentration and the resulting analytical methods. With three-component and four-component systems, chemical methods of analysis become necessary. The general theory of separation by fractional crystallization and distillation comes in at this point. An outline was given of the laboratory course now offered at Cornell University, which is designed to supplement the lecture course and which calls for thirty-three afternoons' work.

8. 'Some Observations on the Teaching of Chemistry': CHAS. SKEELE PALMER.

The paper emphasized: (1) The value of the thorough study of oxidation and reduction tables as a systematic basis for general inorganic chemistry; (2) the conservative use of the periodic sequence in the form of short and long independent series; (3) the lack of an easy, natural and thoroughly satisfactory introduction to general systematic inorganic chemistry after the consideration of the typical elements and the atomic theory; (4) the use of qualitative reactions in the laboratory work of elemen-

tary organic chemistry, pending the use of the necessary but more complicated synthetic work of organic chemistry proper.

9. 'Some Suggestions for the Improvement in Instruction in Technical Chemistry': ARTHUR LACHMAN.

This paper will be published in full in SCIENCE.

10. 'Discussion of Methods used in Different Universities for giving Instruction to Large Classes in Elementary Laboratory Work': WM. MCPHERSON.

11. 'Chemistry in the High School': FREDUS N. PETERS.

12. 'Chemistry in Manual Training Schools': ARMAND R. MILLER.

In this paper the writer gave a description of the method of teaching the subject in the Manual Training High School of Kansas City, Mo. In harmony with the spirit of the school, the practical applications of the subject are prominently brought out and the facts linked, so far as possible, to the things of every-day life. With this same end in view, the pupils are shown through smelters, soap factories, acid works, gas works, etc.

In the study of the metals careful attention is given to the ways in which these occur in nature, the metallurgical processes by which the metals are obtained, and their physical properties, upon which their adaptation to various uses depend. The value of the stereopticon as an aid in arousing and holding an interest in the subject is recognized and a collection of suitable slides is being made. It is not considered wise to attempt to teach qualitative analysis in a one-year course and so all the time is devoted to the study of general chemistry. About one half the time is spent in the laboratory. Brief notes are made there and elaborated at home. A few quantitative experiments are performed in order that the pupils may get some conception of quantitative relations. A course in qualitative analysis is offered, but a second year is de-

voted to it. Pupils who show sufficient ability are encouraged to take up quantitative analysis or assaying, this work being done in the afternoons without credit, as these are not regular courses.

13. 'Notes on the Chlorides of Ruthenium': JAS. LEWIS HOWE.

Claus described double chlorids of trivalent ruthenium of the type $2\text{XCl}, \text{Ru}'''\text{Cl}_3$, and also those of what he considered to be the tetrachlorid of the type $2\text{XCl}, \text{RuCl}_4$. These last Joly showed to be nitroso-chlorids of the type $2\text{XCl}, \text{RuCl}_3\text{NO}$. Antony has recently succeeded in forming a true tetrachlorid, $2\text{KCl}, \text{RuCl}_4$, by the solution of potassium ruthenate, K_2RuO_4 in dilute hydrochloric acid.

When ruthenium tetroxid, RuO_4 , is treated in the cold with a strong solution of cesium (or rubidium) chlorid and a few drops of hydrochloric acid, it is gradually converted into a salt of a new series, cæsium- (or rubidium) oxy-chlor-ruthenate, $2\text{CsCl}, \text{RuO}_2\text{Cl}_2$, which is instantly decomposed by water. On treatment with strong hydrochloric acid this is converted into the tetrachlorid (chlor-ruthenate), $2\text{CsCl}, \text{Ru}'''\text{Cl}_4$. In most of its reactions it closely resembles the ordinary trichlorid.

This ordinary trichlorid has the formula $2\text{CsCl}, \text{Ru}'''\text{Cl}_3, \text{H}_2\text{O}$, but numerous other salts exist with varying proportions between the ruthenium trichlorid and the alkaline chlorid.

When the tetrachlorid is warmed in dilute acid solution with alcohol, rose prisms are formed of the same formula as the ordinary trichlorid, but this salt is very distinct in its properties and may be an aqua-trichlorid, $2\text{CsCl}, \text{RuOH}_2\text{Cl}_3$. This gives the tetrachlorid again with strong hydrochloric acid.

The blue solution produced by the action of H_2S on ruthenium solutions can also be obtained by electrolytic reduction, and is, when concentrated, precipitated by cæsium

chlorid, but the precipitated salt has not yet been obtained in a state of purity. It seems to have the formula $3\text{CsCl}, 2\text{Ru}'''\text{Cl}_2, 2\text{H}_2\text{O}$, but is receiving further investigation.

After treatment with stannous chlorid, ruthenium trichlorid gives a yellow flocculent precipitate with caustic potash. This is soluble in hydrochloric acid, from which there crystallize brilliant yellow octaedra, containing tin, ruthenium and chlorin. These are being investigated.

This paper will be published in the *Journal of the American Chemical Society*.

14. 'On the Existence of a New Element associated with Thorium': CHAS. BASKERVILLE.

Pure thorium salts obtained from five sources were repurified and fractioned first by sulphur dioxide and second by variation in the solubility of the citrates. Three evidences of the complexity of thorium were offered.

1. Pure thorium dioxide has a specific gravity of 10.2. This was fractioned, giving oxides having specific gravities of 9.25 and 10.53. This corroborates Brauner's work on the hydrolysis of the heptahydrated thorium tetrammonium oxalate.

2. Thorium dioxide is slightly radioactive. Crookes has recently found by fractioning pure thorium nitrate that one fraction was three times as active as the other. The author has found the radioactivity to increase with the increase of specific gravity of the oxides. The oxide having the lower specific gravity is inactive. Description of methods of procedure were given.

3d. Pure thorium tetrachloride was prepared and the atomic weight of thorium determined. $223.25 \pm .05$ was the value found, which is given tentatively. The generally accepted atomic weight is 232.6.

These evidences prove the complexity of thorium and from some data already obtained the new body appears to have an

atomic weight between 260 and 280. As the original material came from the monazite sands of the Carolinas, the author desires, in case the element is ever separated in a pure form, and the indications are most favorable, to have it known as *Carolinium*.

This paper will be published in full in the *Journal* of the American Chemical Society.

15. 'Some New Laboratory Furniture': ARTHUR LACHMAN.

The author described a drawer for storing glass tubing (and showed a photograph). The drawer is open on one end and pivoted at the other. When closed it looks like an ordinary drawer, and does not extend beyond the drawercase. Upon opening, it swings out at an angle, the open end permits the inspection and withdrawal of any piece of tubing.

A special laboratory sink was described. It is 18 inches wide, 30 inches long and 4 inches deep. It is cast of iron, $\frac{3}{8}$ inch thick. The inner surface drains towards the center from all points. The straining plate consists of a perforated plate of lead which is hammered into a flange provided in the sink. The waste pipe is screwed on to a projecting pipe by means of a flange, the projecting pipe being cast into the sink. In this way no screws or other obstructions present themselves in the sink proper and the life of the sink is greatly prolonged. The sinks were cast to order, weigh about 100 pounds and cost about \$5.00.

A convenient and cheap air-bath was also described. This is merely an asbestos-covered oven, such as is used for gasoline stoves. Such ovens have been in use in the author's laboratories for over three years with excellent results. They measure about 20 by 14 inches on bottom and are about 20 inches high. A single Bunsen burner can heat them to 170° C. They will hold over sixty funnels for drying purposes. They cost only \$2.80 (in Chicago).

16. 'Recent Developments in Organic Chemistry': ARTHUR LACHMAN.

The following is a brief summary of some of the topics considered: The Richter system of registration; direct nitration of paraffins; graphitic acid; Friedel-Crafts reaction; diazo compounds; the uric-acid group; some curious nitrogen compounds and reactions; some artificial substitutes for cocaine; the odorous ingredients of the jasmine and the orange blossom (methyl anthranilate and indol); the odor of the mercaptans; the increasing importance of physical chemistry for the purposes of organic chemistry; catalysis in organic reactions; the two forms of acetylene di-iodide; the chemical nature of alcoholic fermentation; trivalent carbon; the commercial manufacture of artificial indigo. A number of details and calculations are given in this instance. Tautomerism is defined and illustrated in its various forms. The formation of acetoacetic ether. Molecular rearrangements. The stereochemistry of nitrogen, of sulphur, of tin and of iodine—the three first mentioned form optically active compounds. Some new mercury derivatives of organic compounds. Auto-oxidation. Some new organic derivatives of hydrogen peroxide. Quadrivalent oxygen in dimethylpyrone. Is oxygen really acid forming? Thiele's theory of unsaturated compounds and the benzene ring. Nef's methylene theory. Michael's theory of organic reactions. Conclusion: the unity of organic research work.

The complete paper will be printed in the *Journal* of the American Chemical Society.

17. 'The Electrolysis of Certain Proteids': MARY ENGLE PENNINGTON.

A solution of edestin, a globulin from hemp seed, dissolved in 0.6 per cent. orthophosphoric acid and subjected in a partitioned cell to the action of a current of $N.D._{100} = 0.2-0.4$ ampere and 6-18 volts, gives a heavy white precipitate in the cath-

ode chamber. This precipitate, purified as carefully as possible, contains about 2.8 per cent. of phosphorus and 16.41 per cent. of nitrogen. Its properties do not entirely coincide with any known class of proteids, but approach more nearly to those of the nucleo proteids. It is difficultly soluble in pure cold water, easily soluble in hot or boiling water and separates from the hot solution unchanged on cooling. By pepsin-hydrochloric acid digestion it yields a substance containing about 7 per cent. of phosphorus. Decomposition by boiling with sulphuric acid and subsequent treatment for nitrogen bases yields a white, crystalline substance containing nitrogen. The anode chamber, after electrolysis as above, gives a different substance, also containing phosphorus. Egg albumen behaves in an analogous manner. The cathode product showed about 2 per cent. of phosphorus.

This paper will be published in the *Journal of the American Chemical Society*.

18. 'The Reduction in an Alkaline Solution of 2,4,5 Trimethyl Benzalazine and the Preparation of some Derivatives of the Reduction Products': E. P. HARDING.

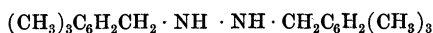
By reducing 2,4,5 Trimethyl benzalazine,



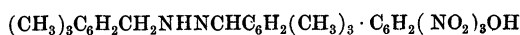
in an alkaline solution, two reduction products may be obtained depending upon the degree of reduction—one a 2,4,5 trimethyl benzal 2,4,5 trimethyl benzyl hydrazone,



and the other a symmetrical 2,4,5 trimethyl dibenzyl hydrazine,



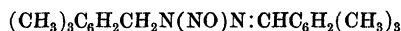
The hydrazone is a weak base. With picric acid it forms the addition product 2,4,5 trimethyl benzal 2,4,5 trimethyl benzyl hydrazone picrate,



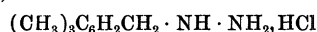
The imid hydrogen atom may be substituted by an acetyl, benzoyl or nitroso group forming the corresponding acetyl, benzoyl or nitroso derivatives, viz :



and

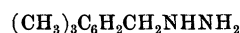


By the action of hydrochloric acid it hydrolyzes to 2,4,5 trimethyl benzaldehyde and to 2,4,5 trimethyl-benzyl hydrazine hydrochloride,

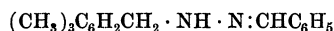


from which the free base may be obtained by the action of caustic potash.

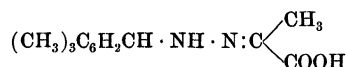
2,4,5 trimethyl benzyl hydrazine



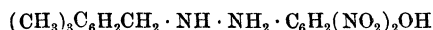
forms with benzaldehyde, benzal, 2,4,5 trimethyl benzyl hydrazone



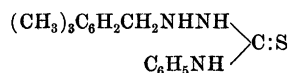
With pyroracemic acid, it forms 2,4,5 trimethyl benzyl hydrazine pyroracemate,



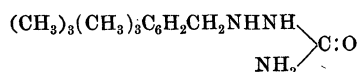
It is also capable of forming addition products. With picric acid, it produces 2,4,5 trimethyl benzyl hydrazine picrate,



with phenyl mustard oil, it forms 2,4,5 trimethyl benzyl phenyl thio semicarbazide



and with cyanic acid, 2,4,5 trimethyl benzyl semicarbazide.



This paper will be presented in the *Journal of the American Chemical Society*.

19. 'The Identification and Properties of Alpha and Beta Eucaïne': CHAS. L. PARSONS.

Alpha and beta eucaïne are new alkaloids which quite recently have been offered to the medical profession as a substitute for cocaine. There seem to be certain advantages possessed by beta eucaïne which are leading to its quite general acceptance. Chief among these are its comparatively low toxicity, its stability when boiled, which allows the solution to be easily disinfected, and its non-excitation of the heart's action. Both of these alkaloids have been synthesized in the laboratory and so far as known are not a product of life. Beta eucaïne acts as a local anæsthetic, like cocaine. Both eucaïnes resemble cocaine structurally and in general chemical properties they react much like cocaine, being easily shaken out of alkaline solution with ether, petroleum ether, benzene, chloroform, etc. Their chief distinguishing reactions are obtained with ammonia, potassium bichromate, mercurous chloride, platinic chloride, potassium permanganate and their actions under polarized light—both in the polariscope and polarizing microscope. Beta eucaïne and its hydrochloride are also characterized by a low solubility in water and alcohol.

This paper will be published in detail in the *Journal of the American Chemical Society*.

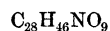
20. 'The Alkaloids of Isopyrum and Isopyroïne': G. B. FRANKFORDER.

The isopyrum, so far as can be learned at present, has only once been studied chemically. Hartsen in a brief paper on *Isopyrum thalictroides*, reported the isolation of two new alkaloids. The one he named isopyrine and the other pseudoisopyrine. He obtained the isopyrine by extracting the tubers with water and precipitating out the alkaloid by means of ammonia. The alkaloid was obtained in the pure form by extracting this ammonia precipitate with ether.

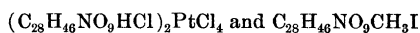
Nothing more was done with the alkaloid. No analyses were made and none of the properties given, not even the melting point.

Pseudoisopyroïne was obtained by Hartsen by extracting the root with alcohol after extracting with water. The alcoholic extract was treated with ammonia as in the case of the water extract. On evaporating off the ether the pseudo alkaloid crystallized out in star-shaped crystals. Nothing was done with this substance, not even the melting point was given.

In beginning the work on *Isopyrum biter-natum* the method given above was tried, but with unsatisfactory results. In fact, many methods were tried, a few of which gave quantities of the alkaloid. Best results were obtained, however, by first extracting with very dilute hydrochloric acid. The hydrochloride was found to be very soluble in water, and hence readily removed from the solid matter. The alkaloid was finally obtained by extracting the residue from the dilute acid with ether or by first neutralizing with ammonia. This latter step is important unless the acid solution be evaporated cautiously. Moderately strong acid decomposes the alkaloid. By extracting the acid and alkaline residues with alcohol, the hydrochloride and the free base, respectively, were obtained. Both were purified and analyzed, giving results which correspond to the formula,



In addition to the above, other salts were formed including the platinum double salt and the methyl iodide compound.



21. 'Derivatives of Camphor Oxime': G. B. FRANKFORDER and P. M. GLASOE.

The great difficulty in the study of camphor oxime is the ease with which it loses a molecule of water and forms the so-called campho nitrile. Camphor oxime acts as both acid and base. We have found that

the basic properties predominate. So marked are its basic properties that it combines with nearly all the common acids and even with the aldehydes forming peculiar para derivatives.

Monochlorcamphor oxime $C_{10}H_{15}ClNOH$.

Until recently no real halogen derivatives of camphor oxime have been made. Free chlorine acts upon it, but forms, instead of a chloride, the common hydrochloride and the nitrile. However, if the oxime is dissolved in ether and treated with sulphur dichloride, the monochloride is formed directly in almost pure state.

Monobromcamphor oxime $C_{10}H_{15}BrNOH$.

The same difficulty in introducing chlorine was experienced in making the bromine compounds. It was finally made by treating a chloroform solution of the oxime in the dark with bromine and allowing to stand until the bromine color had disappeared. The pure substance is inactive toward polarized light, has a specified gravity of 1.48 and an index of refraction of 1.557535 at $15^{\circ} C$.

Dibromcamphor oxime $C_{10}H_{14}Br_2NOH$.

By treating a boiling dilute alcoholic solution of camphor oxime with bromine in excess an oily substance settles to the bottom. The substance was removed, purified and analyzed. The results correspond to the above formula.

Numerous attempts were made to substitute the chlorine and bromine, but as yet results are unsatisfactory. No proof has likewise been obtained of the position in which the halogens enter.

22. 'A Chemical Study of the Seed of *Rhus glabra*': G. B. FRANKFORTER and A. W. MARTIN.

The seed of the *Rhus glabra* or common sumach has been examined, but almost wholly with the idea of determining the amount of tannic acid. In the present paper we have made, so far as possible, an

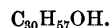
exhaustive examination with special reference to the oils and to the cholesterol present.

We began by studying the seed and husk together, but soon found it advisable to separate them, as most of the oil exists in the seed and all the tannic acid in the husk. The seed contains 9.1 per cent. of oil, while the husk contains 2.5 per cent. On the contrary, the husk contains 7.32 per cent. of tannic acid and 1.35 of malic acid, while the seed contains none.

An examination of the oils showed that the one obtained from the seed resembled that from the husk, the chief difference being in the quantity of foreign substance present. The following is a brief comparison of the properties:

	Seed Oil.	Husk Oil.
Sp. gr. at $15^{\circ}C$.	.923	.933
Index of Refraction at $15^{\circ}C$.	1.48228	1.48764
Saponification Value	194.7	190.1
Iodine Value	86.4	87.2
Drying Properties	None	None
Color	Light yellow	Dark brown

An examination of both the oils showed the presence of a substance resembling cholesterol. It was obtained by the common method for the extraction of cholesterol. It is probable that the substance obtained in each oil is the same. That obtained from the seed oil was so small that it was not studied. The husk oil contained 2.26 per cent. It was readily removed from the oil by acetone. The substance was carefully purified and analyzed. Analysis gave numbers corresponding with the formula



The molecular weight determination gave numbers agreeing with the above formula.

23. 'Phenoxozone Derivatives': H. W. HILLYER.

As indicated in the paper read at the meeting of the Association in New York, when picryl chloride acts on pyrocatechin in presence of two molecules of alkali, one

molecule of hydrochloric acid and one of nitrous acid are split off and a condensation takes place with the formation of dinitro phenoxozone.

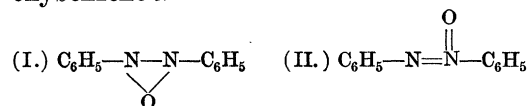
The same kind of action takes place with homopyrocatechin and qualitatively the same action results with the other orthodihydroxy compounds; protocatechuic ethyl ester, æsculitin, daphnetin, alizarine and nitropyrocatechin. The condensation products have been isolated but not in quantity to make satisfactory analyses. Most of them yield brilliant carmine solutions when treated with sodium ethylate. The change produced in this way is only superficial since at least in the case of the simplest one, dinitro phenoxozone, the original compound is precipitated on dilution with water.

The substance produced by action of alcoholic soda on dinitro phenoxozone has been further studied and found to be the strong acid dinitro dioxy phenoxide.

The substance formed by action of one molecule of pyrocatechin, two of picryl chloride and two of alkali is proven to be dipicryl pyrocatechin by analysis and by the fact that it splits off one molecule of picric acid and one of nitrous acid and yields dinitro phenoxozone.

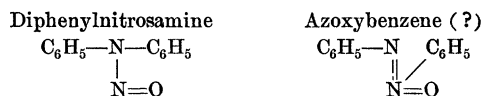
24. 'The Constitution of Azoxybenzene': ARTHUR LACHMAN.

Two formulæ have been proposed for azoxybenzene:



No positive evidence is available for either of these. The author undertakes to show, by a comparison of azoxybenzene with diphenylnitrosamine, that formula (II.) cannot represent the properties of azoxybenzene. There is considerable similarity between (II.) and the structure of diphenylnitrosamine; and since the compounds are

isomeric, similarity of reaction may also be expected:



With four different reagents (hydrochloric acid, phenyl-hydrazine, hydroxylamine, and zinc ethyl) the author obtained prompt and decisive reactions with diphenylnitrosamine under circumstances where azoxybenzene was unacted upon. From this it is concluded that only formula (I.) can be regarded as satisfactory for azoxybenzene. This conclusion is strengthened by thermochemical data; the oxidation of azobenzene to azoxybenzene gives off 257 K, whereas all other classes of nitrogen compounds have negative heats of oxidation. This shows that in azoxybenzene the nitrogen and oxygen have attained the maximum saturation of their affinities.

25. 'The Action of Zinc Ethyl on Nitro and Nitroso-Compounds, A Reply to I. Bewad': ARTHUR LACHMAN.

Bewad has recently claimed priority for the investigation of the above-named reaction. This priority is unquestioned. But Bewad is mistaken in his explanations of the various results obtained. He assumes that the nitro and nitroso groups, NO_2 and NO respectively, behave in a manner exactly analogous to the carbonyl group, CO . The author shows, on the basis of his own work, that this supposed analogy does not exist; that certain nitroso compounds show a peculiarly unique behavior with zinc ethyl; that other nitroso compounds differ from these first, as well as from carbonyl compounds; and that no reliable conclusions whatever can be drawn as yet from the behavior of nitro compounds. There is also some difference of fact to be noted in the work of Bewad and of the author, which calls for further experimentation.

26. 'Some Hydrochlorated Sulphates':

CHAS. BASKERVILLE, LIONEL WEIL and I. F. HARRIS.

The work of Ditte on HgSO_4 , HCl was repeated and found correct. HgSO_4 , 2HCl was also prepared. Hydrated cadmium sulphate ($3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$) was treated with anhydrous hydrochloric acid under different conditions of temperature, time and variation of masses and the water replaced gradually by hydrochloric acid. Eventually, under certain conditions, the sulphuric acid was entirely replaced by hydrochloric acid. E. F. Smith has made similar observations with sodium and potassium sulphates, but in no case was all the sulphuric acid replaced as observed with compounds treated of in this paper.

This paper will be published in the *Journal* of the American Chemical Society.

27. 'The Origin and Use of Natural Gas at Manitou, Colo.': WILLIAM STRIEBY.

The paper opens with a statement of the geological features of the region about Manitou in so far as they have a bearing upon the origin of the carbon dioxid, viz., the limestones at Manitou, the rock-fault following the line of the Ute Pass, the igneous rocks of the higher lands westward at Cripple Creek, etc. Analyses of waters from several springs at Manitou are given and discussed with a view of tracing the source of the mineral matters and gas contained in them. Some theories of the origin of carbon dioxid are briefly summarized and dismissed as inapplicable to this locality. A short discussion of chemical reactions occurring in rocks due to permeating solutions gives a basis for the theory adopted in this paper, and finally a few confirmatory facts are cited and a reference made to the gas springs at Saratoga, New York, and Cañon City, Colorado.

The latter part of the paper details the work done under the direction of the writer in the measurement of the gas given off at some of the springs at Manitou, the calcu-

lation of the quantity of carbonated water to be obtained, the design of suitable apparatus for catching the gas and the choice of compression and carbonating machines to produce the gassed mineral water.

The following papers were read by title. With few exceptions, they will be published in the *Journal of the American Chemical Society*.

'Analysis of a Few Southwestern Coals': HERMAN POOLE.

'Copper—Its Scientific and Commercial Value': W. S. EBERMAN.

'The Photometric Analysis of Sulphates': DANIEL D. JACKSON.

'What Constitutes Instruction in Technical Chemistry?' EDWARD HART.

'Review of Recent Work upon the Structure of Metals and Binary Alloys': J. A. MATHEWS.

'Methods of Standardizing Acid Solutions': CYRIL G. HOPKINS.

'The Determination of Sulphur in Iron and Steel': WM. A. NOYES and L. LESLIE HELMER.

'Decomposition of Sodium Nitrate by Sulphuric Acid—Part III': C. W. VOLNEY.

'Quantitative Determination of Hydrofluoric Acid': W. E. BURK.

'A Theory of the Production of Arsine and Stibine in the Marsh and Gutzzeit Tests, and Some Causes of Quantitative Variations therein': EDWIN A. HILL.

'A Study of the Chemical Composition of Meat Extracts': H. S. GRINDLEY.

'Chemical Changes produced by the Action of Bacteria': H. S. GRINDLEY.

'Derivatives of Diphenyl Ether': A. N. COOK.

'Some Experiments with the Mononitro-orthophthalic Acids': MARTSON TAYLOR BOGERT and LEOPOLD BOROSCHEK.

'On the Determination of Formaldehyde': A. G. CRAIG.

'A Modification of the Sulphuric Acid Tests for Formaldehyde in Milk': A. GUSTAV LUEBERT.

'The Synthesis of Ketodihydroquinazolins from Anthranilic Acid': AUGUST HENRY GOTTHELF.

'A Comparison of the Solubility of Acetylene and Ethylene': SAMUEL A. TUCKER and HERBERT R. MOODY.

'Cryoscopic Experiments with Sulphur': ALEXANDER SMITH.

'The Electrolytic Determination of Molybdenum': LILY GAVIT KOLLOCK and EDGAR F. SMITH.

'The Indirect Weighing of Quantitative Precipitates': R. W. THATCHER.

'Solid Hydrocarbons of the Series C_nH_{2n+2} and Liquid Hydrocarbons of the Series C_nH_{2n} , in the Less Volatile Portions of Pennsylvania Petroleum': C. F. MABERY.

'Specific Heats and Heats of Volatilization of Hydrocarbons of the Series C_nH_{2n+2} , C_nH_{2n} , and C_nH_{2n-4} , in Pennsylvania, Texas, California and Japanese Petroleums': C. F. MABERY.

'Composition of Commercial Paraffine, Vaseline, and Solid and Pasty Mixtures of Hydrocarbons Collected in Oil Wells': C. F. MABERY.

'Composition and Properties of Asphalts from Different Petroleums': C. F. MABERY.

'The Sulphohalides of Lead': VICTOR LENHER.

'The Theory of Factor Weight in Gravimetric Analysis': C. A. LITTLE.

'On Positive and Negative Halogen Ions': JULIUS STIEGLITZ.

'The Quantitative Separation and Determination of Uranium': EDWARD F. KERN.

'The Discovery of Nitro-Glycerine in an Exhumed Body': G. G. Pond.

WILLIAM MCPHERSON,
Secretary.

MEMBERSHIP OF THE AMERICAN ASSOCIATION.

THE following have completed their membership in the American Association for the Advancement of Science during the month of August:

Frank L. Abbott, Professor of Physical Sciences, State Normal School, Greeley, Colo.

Geo. E. Alexander, Chemist and Mining Engineer, 1736 Champa St., Denver, Colo.

Dr. John E. Almy, Instructor in Physics, University of Nebraska, Lincoln, Nebr.

Miss Theodosia G. Ammons, Professor of Domestic Science, State Agricultural College, Ft. Collins, Colo.

John B. Annear, Chemist, Boulder, Colo.

Geo. F. Archer, 31 Burling Slip, New York, N. Y.

Robert Armstrong, M.D., Boulder, Colo.

Barton O. Aylesworth, President State Agricultural College, Ft. Collins, Colo.

Francis N. Balch, Lawyer, 23 Court St., Boston, Mass.

George Bell, Mineralogist, 200 S. Washington Ave., Denver, Colo.

Edgar H. Berry, Draftsman, 72 E. 87th St., New York, N. Y.

Frank W. Blackmar, Professor of Sociology and Economics, University of Kansas, Lawrence, Kansas.

Fred C. Blake, Boulder, Colo.

Newton A. Bolles, Chemist, 1457 Ogden St., Denver, Colo.

Fred Bond, State Engineer, Cheyenne, Wyoming.

Joseph H. Bowman, Electrical Engineer, Apartado 21, Cordoba, Mexico.

Frank P. Brackett, Professor of Mathematics, Pomona College, Claremont, Cal.

David W. Brunton, Mining Engineer, 865 Grant Ave., Denver, Colo.

Mrs. Emma F. J. Bullene, 1431 Court Place, Denver, Colo.

Virgil M. Came, 315 Quincy Bldg., Denver, Colo.

James Carter, M.D., Carbon, Wyoming.

Rollin T. Chamberlin, Hyde Park Hotel, Chicago, Ill.

Ellery C. Chilcott, Professor Geology and Agronomy, Agricultural College, Brookings, S. D.

Arthur Cobb, Architect, 600 Equitable Bldg., Louisville, Ky.

Thomas H. Conroroe, M.D., Lecturer on Biology, Hahnemann Medical College, 833 N. 26th St., Philadelphia, Pa.

Samuel R. Cook, Professor Physics and Chemistry, Washburn College, Topeka, Kansas.

Clifford E. Corwin, Teacher of Science, High School, 508 5th St., Marietta, Ohio.

Mattoon M. Curtis, Professor of Philosophy, Western Reserve University, 43 Adelbert Ave., Cleveland, Ohio.

Alvin S. Daggette, M.D., 400 S. Craig St., Pittsburg, Pa.

A. H. Danielson, Assistant Agriculturist, Agricultural College, Ft. Collins, Colo.

Edward E. Davis, 157 N. 20th St., Philadelphia, Pa.

Manning W. Doherty, Associate Professor of Biology, Ontario Agricultural College, Guelph, Canada.

Charles R. Dryer, Professor of Geography, State Normal School, Terre Haute, Ind.

Philip K. Dumaresq, Sears Building, Boston, Mass.

George M. Duncan, Professor of Philosophy, Yale University, 299 Edwards St., New Haven, Conn.

Miss Alice Eastwood, Curator of Herbarium, Academy of Sciences, San Francisco, Cal.

David C. Eccles, Pharmacist and Chemist, 191 Dean St., Brooklyn, N. Y.

Isaac R. Edmonds, Electrical Engineer, Union Carbide Co., 315 Buffalo Ave., Niagara Falls, N. Y.

E. Waite Elder, Instructor in Physics, High School No. 1, Denver, Colo.

Dr. Arthur H. Elftman, Mining Engineer, 706 Globe Building, Minneapolis, Minn.

Wilbur D. Engle, Professor of Chemistry, Univ. of Denver, University Park, Colo.

Philo J. Farnsworth, M.D., Clinton, Iowa.